

UNIVERSITY OF GONDAR
COLLEGE OF MEDICINE AND HEALTH SCIENCES
INSTITUTE OF PUBLIC HEALTH

***RISK FACTORS OF MALNUTRITION IN UNDERFIVE CHILDREN IN
CHIRO ZONAL HOSPITAL WEST HARERGHE ZONE, OROMIYA
REGION EAST-ETHIOPIA 2012.***

By: - Paulos Samuel

Advisor:-Dr. Belaynew Wassie

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**UNIVERSITY OF GONDAR COLLEGE OF MEDICINE AND HEALTH
SCIENCES INSTITUTE OF PUBLIC HEALTH.**

**RISK FACTORS OF MALNUTRITION IN UNDERFIVE CHILDREN IN
CHIRO ZONAL HOSPITAL, W/HARERGHE ZONE, CASE CONTROL
STUDY.**

By:

Paulos Samuel

Approved by the Examining Board

Head, institute of public Health

Advisor:-

1. _____

Examiner

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List of acronyms

ANC: Antenatal Care

ART: Anti Retroviral Therapy

CSA:-Central Statistical Agency

DALYs: Disability Adjusted Life Years

EDHS: Ethiopian Demographic and Health Survey

ETB: Ethiopian Birr

H/A: Height for Age

IMNCI: Integrated Management of Newborn and Childhood Illness

OR:-Odds Ratio

OTP=Outpatient Therapeutic Program

PDR:-People's Democratic Republic

PEM: Protein Energy Malnutrition

S/C: Stabilization Center

SAM: Severe Acute Malnutrition

UNICEF: United Nation Children's Fund

USD: United State Dollar

VCT: Voluntary Counseling and Testing

Vit A: Vitamin A

W/A: Weight for Age

W/H: Weight for Height

WHO: World Health Organization

Abstract

Background: malnutrition is a public health problem that causes for one third of the underlying causes of childhood death in Africa and more than half in Ethiopia. Identifying the root causes of malnutrition and intervening appropriately would reduce underfive mortality and improve the growth and development of children.

Objective: - to identify risk factors of malnutrition in underfive children in chiro zonal Hospital, west Harerghe zone, Oromiya Region Eastern Ethiopia, 2012.

Methods: Hospital based unmatched case control study design was employed from April 2-may 6/2012 to identify risk factors of malnutrition among under five children in Chiro hospital. Structured questionnaire with anthropometric measurements was used to collect data from 143 cases and 286 controls. All children with malnutrition and selected controls (using systematic sampling) were included in the study. Bivariate and multivariate logistic regression analysis model were carried out to identify the risk factors and Odds ratio with 95% CI was used to show strength of association between each independent variable and malnutrition.

Result:-home delivery of the child(AOR=3.62 95% CI 1.46-8.97),short maternal stature (AOR=3.21 95%,CI 1.41-7.31),diarrhea in the last two weeks preceding the study(AOR=2.64 95% CI,1.67-4.17),paternal smoking habit(AOR=1.95 95% CI,1.12-3.42),inappropriate child feeding practices(AOR=1.95 95% CI,1.19-3.21) and lack of immunization(AOR=1.66 95% CI,1.01-2.73) were significantly associated with malnutrition.

Conclusion and recommendation: in this study home delivery of the child, diarrheal episode, short maternal stature, paternal smoking habit, inappropriate child feeding and lack of immunization were risk factors of malnutrition. Increasing mother's awareness on the benefits of institutional delivery and child immunization, nutritional advice, early prevention and management of diarrheal diseases play a great role in preventing malnutrition.

Key words:-malnutrition, risk factors, stunting, wasting, under weigh & underfive children.

1. Introduction

1.1 Statement of the problem

Malnutrition is a disparity between the amount of food and other nutrients that the body needs and the amount that it is receiving. Under nutrition contributes to more than one third of all deaths in children under the age of five. It does this by reducing children's immunity to fight against diseases and making illness more dangerous. An undernourished child struggles to withstand an attack of pneumonia, diarrhea or other illness –and illness often prevails. Under nutrition is caused by poor feeding and care, aggravated by illness. Children who survive may face cycle of recurring illness and faltering growth – diminishing their physical health, irreversibly damaging their development and their cognitive abilities, and impairing their capacities as adults(1).

Malnutrition is a common problem, especially in developing countries. Of the 11 million children under 5 who die each year in the developing countries mainly from preventable causes, the death of about 54% are either directly or indirectly attributable to malnutrition(2)

According to UNICEF, malnutrition is an underlying cause of over a third of all under-five annual deaths in Africa. Most of these deaths are not attributed directly to malnutrition, but to diseases that move in on vulnerable children whose bodies and immune systems have been weakened by hunger and micronutrient deficiencies. The damage done by malnutrition starts in the womb, a particularly critical period for cognitive and physical development is from the first weeks in the womb until the second year of life. The physical and mental consequences of stunting during this time are irreversible(3)

Across the horn of Africa more than 320,000 children of under five year were severely malnourished .In Ethiopia almost 160,000 children were projected to suffer by the end of the year 2011(4).

Many people in low- and middle-income countries, particularly children, continue to suffer from under nutrition. They consume insufficient protein and energy, and the adverse health effects of this are often compounded by deficiencies of vitamins and minerals. Insufficient breast milk also puts infants at an increased risk of disease and death. Of the risk factors low birth weight and suboptimal breast feeding are the most common ones. These and the other nutrition risks often coexist and contribute to the same disease outcomes. Because of overlapping effects, these risk factors were together responsible for an estimated 3.9 million deaths (35% of total deaths) and 144 million DALYs (33% of total DALYs) in children less than 5 years old. The combined contribution of these risk factors to specific causes of death is highest for diarrheal diseases (73%), and close to 50% for pneumonia, measles and severe neonatal infections(5).

In Ethiopia the prevalence of malnutrition in different parts of the country is high. According to the recent national survey estimation the magnitude of stunting, wasting and underweight were 44%, 10% and 29% respectively(6).

1.2 Literature review

Scholars have conducted researches on determinants of underfive malnutrition in different place and time. Their common findings are categorized under socio demographic/economic, child characteristics and maternal character or child care practices (7-9).

1.2.1 Socio economic/demographic factors

Malnutrition depends not merely on poor nutrition but is associated with a lot of factors. Among them the socio demographic factors like poor socio economic background, food insecurity, poor spacing were found to be associated with stunting in the study of South and South East Asia(10). In middle and lower socio-economic strata, risk of moderate and severe child malnutrition was found to be significantly increased in the group where the father was a smoker(11).

Similarly in identifying the risk factors of underfive malnutrition in Lao PDRs, household characteristics such as primary and secondary schooling of the father were found to be positively associated with height and weight for age of a child(7).

The study done in Serbia also confirmed that one of the predictor of stunting was found to be maternal literacy. The same was true for that of wasting so that children of women who were only able to read part of the sentence in the literacy test were 2.4 times more likely to be wasted than literate women. In this study the wealth index of the family has also an association with child malnutrition. It was shown that in contrast to stunting, children in the lowest quintile of wealth are at higher risk of wasting relative to those in the highest quartile (8). The children in the 2nd quintile showed little increased risk, and in the 3rd quintile showed a moderate increased risk, but it was not significant and there was no trend for 2nd quintile.

A study done in Vietnam showed that mother's level of education and occupation ,house hold size and number of children in the family were significantly related with malnutrition(12).Similarly a study done in Botswana showed that Underweight was less prevalent among children whose parents worked in the agricultural sector than

among children whose parents were involved in informal business. Children brought up by single parents suffered from underweight to a significantly higher level than children living with both parents. The prevalence of underweight decreased significantly as family income increased. The higher the level of the mother's education, the lower the level of child underweight observed(13).

The study done in Ghana identified that malnutrition was related to poverty, maternal education, health care and family planning and regional characteristics. Socioeconomic inequality in malnutrition was mainly associated with poverty, health care use and regional disparities(14).

The study done in South Africa on risk factors on poor anthropometric status of children depicted that factors associated with stunting were household receiving no food hand out and mother not making important household decisions. Underweight is associated with low maternal education(9).

From studies done in Ethiopia the study done in Gondar university hospital on risk factors for severe acute malnutrition showed that socio demographic factors such as family monthly income of less than 50 USD, literacy status of the mothers or paternal literacy and large family size with the number of children greater than 3 were associated with severe acute malnutrition(15).

A recent study at Haromaya district, Oromiya region, East Ethiopia on magnitude and factors associated with malnutrition in underfive children had found that, number of livestock owned by the family, mother's perception of birth weight, and family size, were significantly associated with child malnutrition(16).

1.2.2 Child characteristics

Among child characteristics low birth weight, infectious diseases and lack of immunization were associated with both acute and chronic malnutrition in the finding of the study done in South and South East Asia (10).

Age of the child was associated with malnutrition in Lao PDR's study of risk factors for malnutrition. As the result showed age of the child was significantly associated with under nutrition (children aged 12-59 months were more undernourished than those less than 12 months(7).

Another case control study evaluating the risk factors for protein energy malnutrition in under five children in Iran revealed that, female gender, low birth weight, and history of infectious disease in the previous month had a direct relationship with child malnutrition(17).The result from the study done in Botswana on factors affecting prevalence of malnutrition among under three children revealed that malnutrition was significantly higher among boys than among girl (13).

There was also an interaction between maternal factors and child factors. Community based case control study on the risk factors of malnutrition in south India identified that there was an interaction and these interactions between current maternal depression and low birth weight and between postpartum depression and low maternal intelligence were significant. There was a significant association between the presence of postpartum depression, low maternal intelligence, birth weight, and duration of supplemental breast feeding with the severity of malnutrition(18).

South Africa's study result identified male gender as a risk factor for stunting. According to the report underweight was also associated with child of male gender and prior gastrointestinal symptoms (9).

The study on determinants of stunting in food surplus areas of Gojam Northern Ethiopia revealed that, child being male, his/her age (beyond 7 month than below 7), history of diarrhea in the two weeks before the survey were found to determinants of malnutrition (19) .

1.2.3. Maternal characteristics and child care practices

Factors related to maternal characteristics can directly or indirectly affect child's nutritional status. Literatures show that maternal age ,nutritional status ,ANC follow up during pregnancy and stature are among the predominant ones .Child care practices especially during the first two years of life are very crucial in determining the growth and development of the infants and young children.

Iranian study on maternal factors identified that factors that were directly related to childhood malnutrition were short maternal stature, maternal unemployment, and hyper emesis of pregnancy (17).

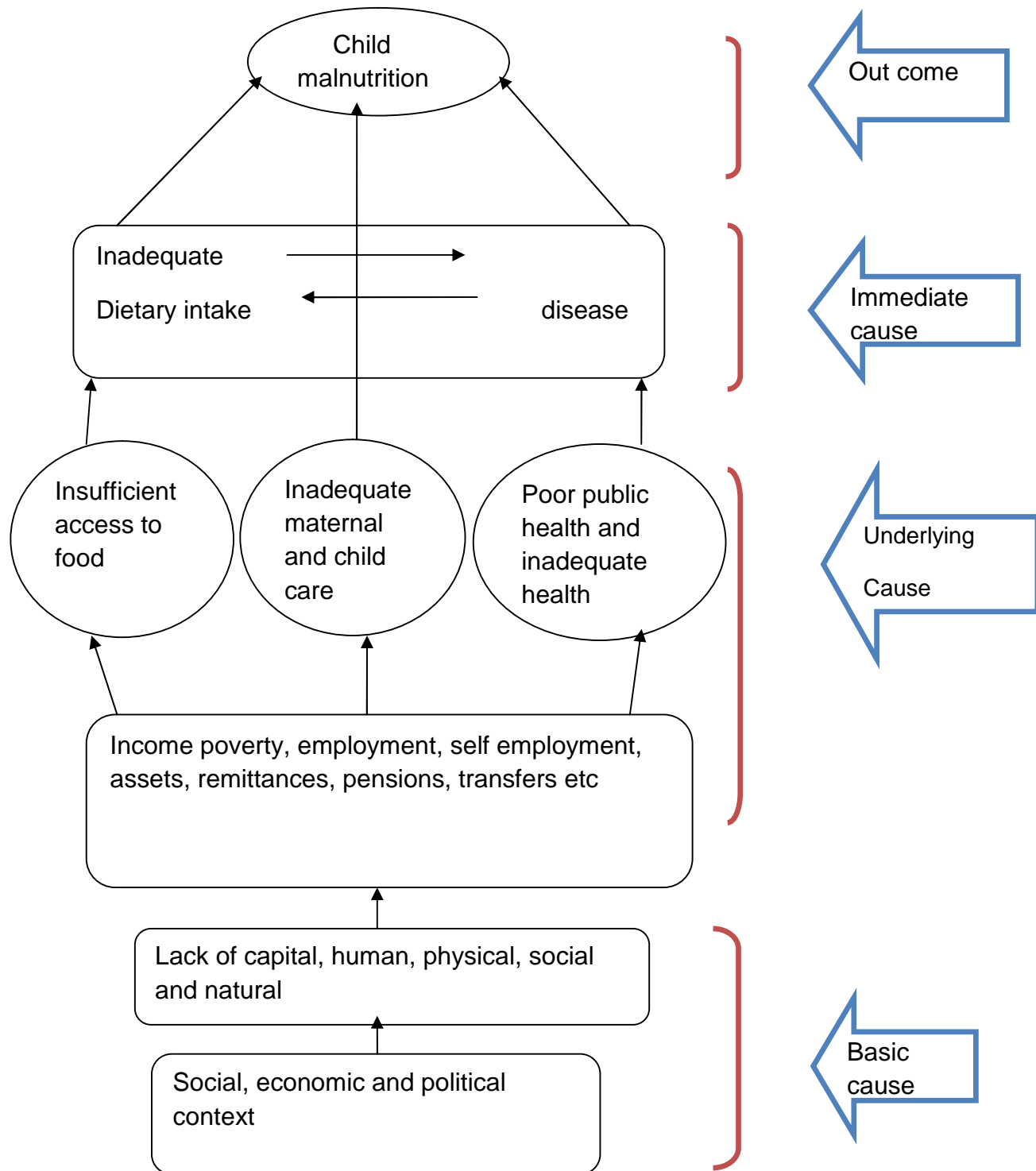
South Africa's result showed that factors associated with stunting were mother's perception that child was not growing well and underweight was associated with perception that the child was not growing well and any current breastfeeding (children < 24 months(9).

Comparative cross sectional study done in Gimbi district , Oromiya Region Ethiopia had found that institutional delivery was associate with malnutrition(20).

Deprivation of colostrum, duration of breastfeeding, prelacteal feedings, age of supplementation, method of feeding and first food given at time of weaning were identified as determinants of stunting among children in the study in East Gojam Northern Ethiopia (19).

A hospital based case control study on risk factors of severe underfive children in Gondar university hospital showed that Inappropriate infant and young child feeding practices were commonly seen in children with severe acute malnutrition. The identified inappropriate feeding practices were supplementation with prelacteal feeds, lack of exclusive breastfeeding in the first six months of age late initiation (at 12 months of age or beyond) of complementary diet and bottle-feeding (15).

Annex:-V conceptual frame work of malnutrition



(Adapted from unicef 1990)

Figure 1:- conceptual frame work

1.3 Justification

Nutritional status of a child is an indicator of country's both economic and health status. Children due to lack of adequate and appropriate food intake would be prone to different childhood illnesses and their growth and development will also be impaired which further reduces their school performance and will then lead the country for underdevelopment.

As Ethiopia is among countries on the strive to achieve MDG 4 being remained with only three years, much effort is expected to be implemented and also strengthen the already started ones. Studies show that malnutrition is commonly seen in some parts of the country in a higher magnitude even in the areas where there is adequate food production. Though there are some studies trying to show the prevalence of malnutrition there are only limited studies exploring the deep rooted causes of malnutrition using different designs than the common cross sectional one. It was difficult to come across such studies in the study area to the best of the researcher despite the presence of long term and large magnitude of the problem .

Therefore the finding of this study will give some insights in the identification of the root causes of malnutrition and planning appropriate interventions so as to reduce under-five mortality rate more than the present number. The result is also helpful for programmers, policy makers and stake holder in different position to plan appropriate intervention strategy and implement accordingly.

2. Objective

- To identify risk factors of malnutrition in children under the age of five years in chiro zonal hospital/harerghe zone, Oromiya region East-Ethiopia 2012.

3. Methods and materials

3.1 Study design

A hospital based unmatched case control study design was employed to identify risk factors of malnutrition among under five children in chiro zonal hospital.

3.2 Study area and period

The study was conducted at chiro zonal hospital from April 2-May 6 /2012. The hospital is found in chiro town, zonal town of west harerghe, Oromiya region and is located at 345 km East of Addis Ababa. It serves for around 1,436,679 people under its catchment. It has an outpatient department (adult, under five and emergency), Inpatient (gynecology, obstetrics, medical, surgical pediatrics, ophthalmology), Intensive Care Unit, Operation room, Radiology, Pharmacy, Laboratory, and Clinics (ART, TB, VCT, Ophthalmology and dental clinics). It has 101 technical and 89 supportive staffs.

3.3 Source and study population

Source population:-Source population of this study were all underfive children attending chiro hospital for any reason/illness during the study period.

Study population: -

Cases: Underfive children visiting the hospital and having severe or moderate malnutrition that was classified as stunting, wasting or underweight.

Controls: Underfive children attending the hospital during the study period for any illnesses/ other reasons, were not classified as having malnutrition (stunting, wasting or underweight) and were selected systematically for the study.

Inclusion and exclusion criteria.

Inclusion criteria:-

- Children with moderate malnutrition whose z score lies below -2 SD were included.
- Children with no malnutrition or whose z score lies above -2 were included as controls.
- Children with Severe malnutrition Having oedema or other signs of severe malnutrition with their mothers or care givers were included as cases.
- Controls With neither oedema nor other signs of malnutrition and their caretakers/mothers were included in controls.
- Admitted undernourished children to pediatrics or infant care units, or OTP/SC whose mother/caregiver was present by the time of interview were included.
- Underfive children without malnutrition that were admitted at pediatrics ward and were not seriously ill were included in the study as control.

Exclusion criteria

- Children coming to the hospital with their sisters or brothers whose age was below 14 years were excluded both from the case and control.
- Children having cancer or any chronic conditions such as heart failure, hepatic failure.
- Children with severe diseases or classifications according to IMNCI guidelines or other guideline and were found critical needing urgent treatment or referral were excluded from controls.

3.4 Sample size & sampling procedures

Sample size determination

Sample size was calculated using EPI-INFO version 3.5.1

With the following assumptions:-

- Level of confidence=95%
- Power =90%
- Proportion of controls with exposure (suboptimal feeding)=47% (from EDHS 2011)
- Ratio of sample size cases/control=1:2
- OR=2 (the cases have 2 times higher risk than controls) and;

The final sample size for cases and controls was **143** and **286** respectively.

Total sample size was =429

Sampling procedure

The study participants were all Children under the age of five visiting the hospital during the study period. All children fulfilling the criteria for malnutrition classification both admitted at OTP/SC and new cases from OPD & MCH were included in the study as a case. Comparable controls were selected from children coming to the hospital using a systematic sampling technique .All children were screened before they were categorized in to either of the groups. On average 45 children visited the hospital for treatment, immunization, follow up and other purposes in a day in the previous month ($45 \times 21 = 945$). Therefore taking this number as a reference I had divided $945/286 = 3$. Therefore every third child was included in the study as a control. In case if the third child was a case the fourth was interviewed .On the first day randomly a second child was selected by a lottery method and therefore adding 3 the next control was

selected. From Children who were identical twins only one child was included in the study the other one was excluded.

3.5 Data collection procedures (instrument and personnel)

The mothers or care givers were interviewed using pre-tested, structured questionnaire for assessing risk factors of underfive children in the study area. Anthropometric measurements were also taken to know the H/A,W/H and W/A of the child and was cross checked against WHO/CDC growth curve, child growth standard (z score) of WHO reference population classification charts and tables were used to classify as either case or control.

Structured questionnaire, weight scale, height measuring scale and mid upper circumference (MUAC) were used as data collection tools.

For children less than 2 years length was taken on lying position and height was measured on standing position with bare foot for those greater than 2 years. Weight was measured to the nearest 0.1kg while wearing light clothes.

The data was collected by two female diploma nurses and one male BSC Nurse.

3.6 Data quality assurance

The questionnaire was originally prepared in English language. It was then translated to Afan Oromo language and finally translated back to English by different language teachers in the area to check its consistency and enter into computer. In order to maintain the data quality a two days intensive training was given to data collectors prior to data collection. Pre-test was conducted on 21 children (5 %) of the sample at Doba health center which is 57 km away of chiro hospital. The questionnaire was corrected and modified accordingly. Weight scale was checked regularly and adjusted to zero between each measurements and height was measured following the standard measurement steps or procedures. The filled questionnaire was cross checked on daily basis for correctness and completeness and feedback was given and corrective measures were taken on daily basis accordingly.

3.7 Variables of the study

3.7.1 Dependent variable

- Malnutrition

3.7.2 Independent variables

Socio-economic and demographic variables;

- Type of family, family size, income,
- Maternal/paternal education and occupation

Child characteristics;

- Sex of the child
- Age of the child
- Number of siblings
- Birth order
- Morbidity status

Child care practices;

- Feeding, exclusive breast feeding or complementary.
- Age at initiation for complementary feeding.
- Duration of supplemental breast feeding
- Hygiene, how is the feeding practice of the mother with regard to hygiene.
- Health care seeking and immunization
- Frequency of feeding
- Meal preparation practice of the mother or care giver.
- Place of delivery of the child

Maternal characteristics;

- Age,
- Height,
- Number of children ever born,
- ANC visit
- Place of delivery of the child
- Weight
- Autonomy in decision-making
- Maternal/paternal Smoking habit.

3.8 Operational definitions

- **Malnutrition /under nutrition:** those children classified or diagnosed as having stunting, wasting or underweight according to WHO classification/ child growth standard.
- **Severe acute malnutrition:** weight for height (below -3z scores of the median WHO growth standards), by visible severe wasting, or by the presence of nutritional oedema.
- **Stunting:** H/A below -2 standard deviation from the median height for age of WHO reference value.
- **Wasting/H** below -2 standard deviation from the median WHO reference value.
- **Under weight:** W/A less than -2 SD from the median WHO reference value.
- **Up-to-date for immunization:** a child is said to be up-to-date for immunization if he/she has received all the required antigens for his age according to the national immunization schedule.
- **Up-to-date for Vit A:** a six month or more age child is said to be up-to-date for vit A if he/she has received a dose within the last six months.
- **ANC visit:** women attending ANC visit at least three times during the time of pregnancy of the child.

- **Meal type (dense & varied):**-solid or semi solid food of different grain and cereal (corn, maize, sorghum, pean, bean, nut, etc combined together), egg. Mashed potato, shuro if possible meat and made thick. Food diversity (four or more types of food)
- **Uneducated:** a person who can't read and write or have no formal education.
- **ARI:** - child who has cough, fast breathing/difficult breathing.

3.9 Data processing and analysis

The data were checked for completeness and consistency and then coded and entered in to EPI info version 3.5.1. finally exported to SPSS version 16 for analysis. The data after being entered into the computer were cleaned, recoded and explored for missing data before analysis.

The data were analyzed using SPSS version 16 and descriptive and analytical statistics was computed and interpreted accordingly. Both bivariate and multivariate logistic regression analysis were done to identify risk factors .Variables with p value less than 0.20 in bivariate analysis were entered into the model by Back ward stepwise method for multivariate analysis. A p value less than 0.05 were considered a statistically significant. Odds ratio with 95% CI was used to show the strength of association. Descriptive and analytical statistics was presented with text and tables.

4. Ethical consideration

Ethical letter was obtained from the ethical review committee of the University of Gondar. Permission was given from the hospital to conduct the research after getting the ethical clearance letter. Oral informed consent was obtained from the mothers of the child or care giver. She was informed about the right to refuse or non participation without any negative effect on the service her child gets. The confidentiality of the data was maintained in that the name of the child was omitted and the information was not shared by other persons before analysis. Treatment or care was given for a child with malnutrition and other compliant according to the purpose of hospital visit after the study.

5. Result

5.1 Socio demographic characteristics

A total of 429 children under five years of age were assessed for their nutritional status using anthropometric measurements. Out of these 143 children were malnourished (cases) and the other 286 had no malnutrition (143 cases and 286 controls). The mean (\pm SD) age of the cases was 23.4(\pm 15.27) and that of controls (\pm SD) was 19.66(\pm 13.93) months. Among the cases, 60(41.90%) were stunted, 45(31.46%) underweight, 25(17.48%) wasted and about 13(9.09%) were admitted for severe acute malnutrition (SAM). There were 69(48.3%) males in the cases and 172(60.1%) in the controls. Most of the mothers, 116 (81.1%) among cases and 180(62.9%) among controls were found to be uneducated. Majority of fathers among cases 130(90.9%) and 218(76.8%) controls had no formal education. Families earning estimated monthly income of less than 638 ETB were 103(72.0%) in the cases and 156 (54.5%) in the controls. Similarly those families with number of children greater than three were 95 (66.4%) among cases and 149(52.1%) among controls. Mothers who were found to be shorter (height less than 150 cm) were 18 (12.6%) in the cases and 14(4.9%) in the controls. Most of the children 136 (95.1%) were born at home in the cases and 225(78.7%) in the controls. Higher number of fathers in the cases 41(28.7%) and 36(12.6%) in the controls were found to be smokers.

5.2 Child characteristics

Children who had fever in the last two weeks before the study were 73(51%) in the cases and 110 (38.5%) in the controls. Acute respiratory illness (ARI) in the last two week preceding the study was seen in 70(49%) of the cases and 95 (33.2%) of controls. About 71(49.7%) children among cases and 84(29.4%) among controls

were not up to date for immunization. Similarly 79(55.2%) children in cases and 91(31.8%) children in controls were not up to date for Vitamin A. Diarrheal episode during the last two weeks before the survey was seen in 86(60.1%) of the cases and 91(31.8%) in controls.

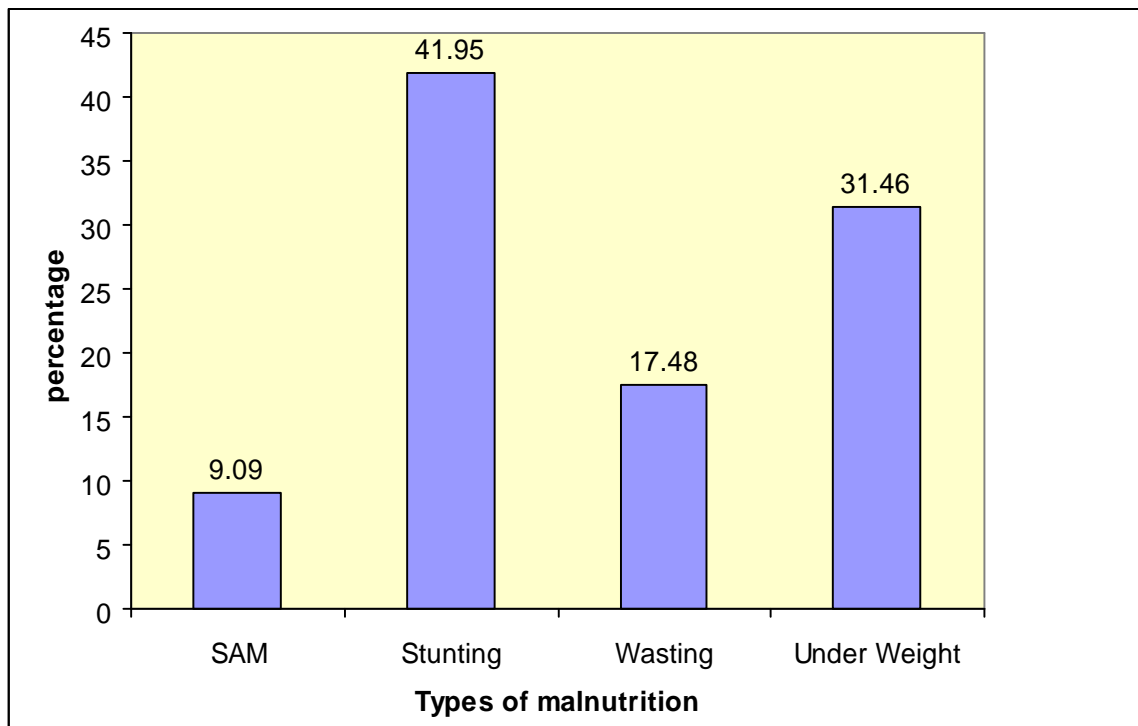


Figure:-2 types of malnutrition among underfive children with malnutrition in chiro zonal hospital 2012.

Table:-1 child characteristics among cases and controls at chiro hospital May 2012.

Variables	Cases no=143	Controls no=286	Total
Sex of the child			
male	69(48.3%)	172(60.1%)	241(56.2%)
Female	74(51.7%)	114(39.9%)	188(43.8%)
Age of child			
>24 months	71(49.7%)	103(36%)	174(40.6%)
≤24 months	72(50.3%)	183(64%)	255(59.4%)
Birth order			
Second from last	51(35.7%)	58(20.3%)	109(25.4%)
First/last	92(64.3%)	228(79.7%)	320(74.6%)
Diarrhea in the last two weeks			
Yes	86(60.1%)	91(31.8%)	177(41.3%)
No	57(39.9%)	195(68.2%)	252(58.7%)
Fever in the last two weeks			
Yes	73(51.0%)	110(38.5%)	183(42.7%)
No	70(49.0%)	176(61.5%)	246(57.3%)
ARI during the last two weeks			
Yes	70(49.0%)	95(33.2%)	165(38.5%)
No	73(51.0%)	191(66.8%)	264(61.5%)
Not up to date for immunization			
Yes	71(49.7%)	84(29.4%)	155(36.1%)
No	72(50.3%)	202(70.6%)	274(63.9%)
Not up to date for vitamin A			
Yes	79(55.2%)	91(31.8%)	170(39.6%)
No	64(44.8%)	195(68.2%)	259(60.4%)

Table:-2 maternal/care taker's socio demographic characteristic among cases and controls of underfive children at chiro zonal Hospital, May 2012.

Variables	cases no=143	controls no=286	Total
Paternal educational status			
Uneducated	91(63.6%)	144(50.3%)	235(54.8%)
Read and write	2(1.4%)	3(1.0%)	5(1.2%)
Primary education(1-8)	37(25.9%)	71(24.8%)	108(25.2%)
Secondary education(9-12)	7(4.9%)	25(8.7%)	108(25.2%)
Diploma	4(2.8%)	32(11.2%)	36(8.4%)
Degree and above	2(1.4%)	11(3.8%)	13(3.0%)
Marital status			
Married	130(90.9%)	270(94.4%)	400(93.3%)
Divorced	13(9.1%)	16(5.6%)	26(6.1%)
Family size (number of children in household)			
>3	95(66.4%)	149(52.1%)	244(56.9%)
3	48(33.6%)	137(47.9%)	185(43.1%)
Maternal educational status			
Uneducated	116(81.1%)	180(62.9%)	296(69%)
Read and write	6(4.2%)	7(2.4%)	13(3%)
Primary education(1-8)	19(13.3%)	46(16.1%)	65(15.2%)
Secondary education(9-12)	1(0.7%)	23(8%)	24(5.6%)
Diploma and above	1(0.7%)	30(10.4%)	31(7.2%)

Continued.....

Variables	cases	controls	Total
Monthly income			
< 638 ETB	103(72.0%)	156(54.5%)	259(60.4%)
638 ETB	40(28.0%)	130(45.5%)	170(39.6%)
Place of delivery of the child			
Home	136(95.1%)	225(78.7%)	361(84.1%)
Health institution	7(4.9%)	61(21.3%)	68(15.9%)
Maternal height			
<150 cm	18(12.6%)	14(4.9%)	32(7.5%)
150 cm	125(87.4%)	272(95.1%)	397(92.5%)
Mother had ANC visit during pregnancy			
No	85(59.4%)	120(42%)	205(47.8%)
Yes	58(40.6%)	166(58%)	224(52.2%)

5.3 Child care practices of families/care taker's

Most mothers' breast fed their Child both in the cases, 123/143 (86%) and the controls 266/286 (93%).Majority of them both among cases 77/143(53.8%) and control 166/286(58.0%) exclusively breast fed till six months of age but mothers of the cases, 64/143 (44.8%) and controls, 75/286 (26.2%) mostly had not given colostrums immediately after birth. The frequency of breast feeding was lesser in almost both mothers of cases 22(32.8%) and controls 65(36.9%).Prelacteal feeding was practiced by 41/102(28.7%) of mothers from the cases and 54/232(18.9%) controls. Bottle feeding was more frequently used by cases 89(67.4%) than controls 147(57.9%).Meal preparation by most mothers in the cases 78(54.5%) was unhygienic than in the controls 100(35.0%).

The way mothers of cases 109 (76.2%) and of controls 151(52.8%) prepare meal/food was also not appropriate (not dense and from different cereals or mitin).

5.4 Risk factors associated with under nutrition in children under the age of five years.

The bivariate analysis have shown that , parental education, monthly income of less than 638 ETB, child birth order (second from the last), not being up to date for Vitamin A ,lack of ANC visit during pregnancy, not ever breast fed the child, deprivation of colostrums immediately after birth, unhygienic preparation of meal and prelacteal feeding were significantly associated with malnutrition.

In multivariate analysis home delivery of the child(AOR=3.62 95% CI 1.46-8.97) short maternal stature (height less than 150 cm) (AOR=3.21 95%,CI1.41-7.31)diarrhea in the last two weeks preceding the study (AOR=2.64 95% CI,1.67-4.17) paternal smoking habit (AOR=1.95 95% CI,1.12-3.42),inappropriate feeding practice(AOR=1.95 95% CI,1.19-3.21) and not being up to date for immunization (AOR=1.66 95% CI,1.01-2.73 were significantly associated with malnutrition. Children born at home had 3.62 times higher risk of developing malnutrition than those born at health institution. It was also observed that those children whose mother's height was less than 150 cm had 3.21 times higher risk of having malnutrition as compared to those whose mother's height was above 150cm. The result showed that children with diarrheal episode in the last two weeks preceding the study were 2.64 times more likely to be malnourished as compared to those who did not have. Paternal smoking habit had also showed an association in that children whose father was a smoker were 1.95 times more likely to develop malnutrition than those whose father was non smoker. Children with lack of immunization were 1.66 times likely to be malnourished than those were up to date for immunization. Children getting not dense and varied energy rich foods were 1.95 times more likely risk of having malnutrition as compared to those with energy rich and dense food (table3).

Table:-3 Results of bivarite and multivariate logistic regression model of risk factors associated with underfive malnutrition in chiro zonal hospital, May 2012.

Variables	Cases	Controls	COR 95% CI	AOR 95% CI
Paternal Education				
Uneducated	91	144	1.76(1.16-2.66)	
Read and write	2	3	0.95(0.16-5.78)	
Primary & above	50	139	1	
Family size (number of children in the house hold)				
>3	95	149	1.82 (1.20-2.76)	
3	48	137	1	
Maternal educational status				
Uneducated	116	180	3.04(1.98-5.14)	
Read and write	6	7	0.75(0.25-2.29)	
Primary & above	21	99	1	
Monthly income				
< 638 ETB	103	156	2.15 (1.39-3.31)	
638 ETB	40	130	1	
Sex of the child				
Male	69	172	0.62 (0.41-0.93)	
Female	74	114	1	
Age of the child				
> 24 months	71	103	1.75 (1.17-2.63)	
24 months	72	183	1	
Birth order				
Second from last	51	58	2.18 (1.39-3.41)	
First/last	92	228	1	
Place of delivery				
Home	136	225	5.27(2.34-11.85)	3.62(1.46-8.97)**
Health institution	7	61	1	
Diarrhea in the two weeks				
Yes	86	91	3.23 (2.13-4.91)	2.64(1.67-4.17)**
No	57	195	1	
Fever within two weeks				
Yes	73	110	1.67 (1.11-2.50)	
No	70	176	1	
Child had ARI within 2 weeks				
Yes	70	95	1.93 (1.29-2.91)	
No	73	191	1	

Continued....

Variables	Cases	Controls	COR ,95% CI	AOR, 95% CI
up to date for immunization				
No	71	84	2.37(1.57-3.59)	1.66(1.01-2.73)**
Yes	72	202	1	
up to date for vit A				
No	79	91	2.65(1.750-3.99)	
Yes	64	195	1	
child breast fed				
No	20	20	2.16(1.12-4.17)	
Yes	123	266	1	
Child get colostrums immediately after birth				
No	64	75	2.28(1.50-3.48)	
Yes	79	211	1	
Prelacteal feeding				
Yes	41	54	1.73(1.08-2.76)	
No	102	232	1	
Food hygienically prepared				
No	78	100	2.23(1.48-3.36)	
Yes	65	186	1	
Meal dense/varied				
No	109	151	2.87(1.83-4.49)	1.95(1.19-3.21)**
yes	34	135	1	
Maternal height				
Less than 1-50 cm	18	14	2.79(1.35-5.81)	3.21(1.41-7.31)**
Greater than 150 cm	125	272	1	
ANC visit during pregnancy				
No	85	120	2.03(1.35-3.05)	
Yes	58	166	1	
Paternal smoking				
Yes	41	36	2.79(1.69-4.62)	1.95(1.12-3.42)**
No	102	250	1	

****significantly associated at p value < 0.05**

6. Discussion

Malnutrition remains the major public health problem of the society and many studies in Africa forwarded different factors associated with child malnutrition.

The current study has shown that diarrheal episode was mostly seen in children classified as cases than that of controls and children with diarrheal episode in the last two weeks preceding the study had 2.63 times more risk of having malnutrition than those who had no diarrhea. This finding is supported by the study conducted in South Africa(9) and East Gojjam, Ethiopia (19).This could be due to the fact that during diarrheal episode children may lose much amount of nutrients , fluid and electrolytes . Nutrient absorption by small intestine will also be poor. The overall effect of this will lead the child to wasting/underweight. Repeated episodes of diarrhea with poor management predispose the child for chronic malnutrition (stunting).

The finding of this study has shown that place of delivery of the child was determinant factor for child malnutrition. Child born at home had 2.95 times more likely risk of having malnutrition than those born at health institution. This can be explained that Institutional delivery is not only for the mother's health and good pregnancy outcome but also important for the growth, development and prevention of child malnutrition. By the time the child is born at health facility the mother will be advised and encouraged on early breast feeding including colostrum which is very essential for the child future growth and development. She will also be given vitamin A and the child will start immunization .Feeding counseling including frequency of feeding, positioning attachment, duration of exclusively breast feeding and appropriate age to start complementary feeding and the type of complementary feeding will also be taught to the mother .These and others are the advantages that the mother will get for herself as well as for her child by giving birth at health institution. This finding is consistent with the study done in Gimbi district Oromiya Region, Ethiopia (20).

Not being up to date for immunization or lack of immunization was also associated with malnutrition. Child who was not up to date for immunization had 1.66 fold increased risk of malnutrition.

This can be explained as the child who is not immunized is vulnerable to diseases and those diseases will either reduce the child's appetite or interfere with absorption and utilization of the food. The study finding of South and South-East Asia(10) and that of Iran(17) further elaborated this association in their study.

Another very important factor was inappropriate feeding practice of the mothers or care givers. Commonly thin gruel and family foods were used to feed the child and these were not dense to deliver adequate energy that the child's body needs .The type and variety of the cereals and ingredients used for child feeding also determines the amount of energy from the food. This study had identified that lack of adequate and variety food for the child affects the nutritional status of the child. This is in agreement with the study in South Africa(9), Haramaya, East Hararghe (16), Gondar university hospital (15) and East Gojjem(19), Ethiopia .

Short maternal height was significantly associated with child malnutrition. Children with mothers whose height was less than 150 cm had 3.21 times more risk of malnutrition than children whose mothers height was above .The nutritional care females get during the period of childhood determines the nutritional status of their future child. As short maternal stature could be due to child hood malnutrition females who did not get nutritional attention during time of child hood and pregnancy are likely to deliver a low birth weight baby. Maternal nutrition both before and during pregnancy influences the growth and development of the fetus and its birth weight; it affects her chance of surviving the delivery. Small maternal size leads to low birth weight and subsequent growth failure in children, leading to small adult women. Genetic predisposition and environmental factors still increase the probability of delivering a low birth weight baby or malnourished child .This finding was in agreement with the study done in Iran(17).

Paternal smoking habit was also found to be associated with child malnutrition. Those children whose father was smoking had 1.95 risk of being malnourished. This shows that the effect of smoking is not only limited to the father but extends to the family as a whole .It could affect the health of the father and also the family making them passive smokers and over all it could negatively affect their economy. Similar association was found from the study done in Dhaka Bangladesh in underfive in diarrheal hospital(11).

7. Strength and limitation of the study

Strength

- Cases and controls were selected from the same/similar population.

Limitation of the study

- ✓ Difficulty to establish temporal relationship between exposure and disease.
- ✓ Only one risk factor was used for sample size calculation.
- ✓ Hospital based studies are difficult to generalize

8. Conclusion

The finding of the current study have shown that child with diarrheal disease within the last two weeks preceding the study, home delivery of the child, lack of immunization for the child, short maternal stature, paternal smoking habit and inappropriate child feeding practices were risk factors associated with malnutrition.

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9. Recommendations

Based on the findings the following recommendations were forwarded:-

- ✓ The zonal health department together with partners needs to provide health education for the community on prevention and management of diarrheal diseases and on benefits of immediate health seeking after occurrence to prevent further complications.
- ✓ Health professionals need to raise mother's awareness and also encourage on institutional delivery.
- ✓ Health professionals and HEWs need to work on nutrition promotion and give appropriate counseling and advice on good child feeding practices including benefits of child immunization.
- ✓ The negative health and economic consequences/impact of paternal smoking on the family need to be taught by woreda health office and zonal health departments.
- ✓ FMOH in collaboration with partners and RHB need to provide continuous training for health workers to strengthen the counseling and delivery of health education for mothers.
- ✓ Further study to identify the risk factors of each types of malnutrition need to be done by interested researchers.

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11. Annex

Annex:-I English version Questionnaire

This questionnaire is prepared to collect information on risk factors of underfive malnutrition in chiro zonal hospital.

Consent form

Greetings, hello,

My name is _____. I am working as data collector for the research being conducted by the collaboration of University of Gondar college of medicine and health sciences, institute of public health, so as to identify risk factors of malnutrition in underfive children in this hospital.

Your name/your child's name will not be written on this form and will never be used with any information you may tell me. You don't have to answer any questions that you don't want and you may end this Interview at any time you want. However, your honest answer to these questions is very important for the purpose of the study. We would very much appreciate your participation in this survey by genuinely responding to the interviews. In addition to the interview your child will be screened by measurement of weight, height and MUAC in order to check the presence or absence of malnutrition. Would you be willing to participate?

It would take 30 minutes to complete the questionnaire

Signature of the interviewer certifying that informed consent has been given verbally by

Respondent code _____.

001. Questionnaire identification number /_____/_____/

002. Interviewer code_____ Name_____

003. Date of interview_____

004. Residence_____

005. Result: 1. Completed____ 2 Partially completed____ 96.Others (Specify)

Checked by:-

Supervisor; Name_____, Signature_____

Part one socio demographic/economic status			
s. n	Question	Response	skip to /remark
101	Head of HH	1.male 2.female	
102	marital status	1. Married 2. Divorced 3. Widowed 4. Separated 5. Single	
103	Total family size	_____	
104	Total number of siblings	_____	
105	Maternal education. What is the highest grade attended?	1.Can't read and write 2.Read and write 3.Primary(1-8) 4.Secondary (9-12) 5.Diploma 6.Degree or above	
106	Paternal education What is the highest grade he attended?	1.Can't read and write 2.Read and write 3.Primary(1-8) 4.Secondary(9-12) 5.Diploma 6 Degree or above	
107	Mothers occupation	1.Housewife 2.Farmer 3.Merchant 4.Gov't employee 5..Private organization 96. Other, specify.	
108	Father's occupation	1.Student 2.Farmer 3.Merchant 4.Government employee 5.Private organization 6.Daily laborer 96.Other	

109	Monthly income in birr	_____													
110	Who decides how the money you earn will be used?	1. Only spouse 2. Only husband 3. Both jointly													
111	Do you have live stock, herd or farm animal?	1.yes 2.no													
112	If yes, how many? - Milk cow, Oxen and bulls? - Goat? - Sheep? - Chicken? - Horse, donkey mule? Total	<div style="display: flex; justify-content: space-around;"> yes no </div> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>													
113	Do you have agricultural land?	1 Yes 2. No													
113.1	If yes How many agricultural lands do you have?	. _____(local unit) (qindii or Hectar)													
114	Ethnicity	1.Oromo 2.Amhara 3 4.Tigre 5.Gurage 96.others													
115	Religion	1.Orthodox 2.muslim 3.Protestant 4.Catholic 96.Others													
	Part two child characteristics														
201	Sex of child	1.male 2.female													
202	Do you remember your child's birth weight?	1.yes 2.no	if no skip to # 203												
202.1	if yes how much was it	1. _____kg													

203	When your child was born how big was he/she?	1.Very large 2. Average 3. Very small	
204	Child age	_____month	
205	Child's Birth order	1.first 2.second 3.last 4 second from the last	
206	Place of delivery	1.home 2.health institution	
207	Gestational age at birth	in weeks_____	
208.1	Current Weight	_____kg	
208.2	Height	_____cm	
208.3	MUAC	_____cm	
209	Does the child have pitting oedema?	1.yes 2.No	
210	For what purpose did the child attended the hospital	1.Growth monitoring 2.Treatment 3.Immunization 4 Follow up 96.Other specify	
211	Has the child had diarrhea in the last two weeks?	1.yes 2.no	
212	Has the child had fever in last two weeks?	1.yes 2.no	
213	Has the child had upper respiratory tract infection?	1.Yes 2.no	
III. Child care practice			
301	How regularly does the child attend the hospital?	1.weekly 2.monthly 96.other	

302	<p>Has the mother/ caregiver received counseling on the following topics?</p> <ul style="list-style-type: none"> ✓ Diarrhea ✓ Healthy eating ✓ Breastfeeding ✓ Complementary feeding ✓ Food fortification ✓ Growth Chart ✓ Hygiene ✓ Other_____ 	<p>(1= Yes; 2= No)</p> <table border="1"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>															
303	Is the child's immunization up to date?	1.yes 2.no															
304	Is the child up to date for vitamin A?	1.yes 2.no.															
305	Have you ever breast fed your child?	1. Yes 2. No	if yes go to #307														
306	if not reason out	_____															
307	Had the child been given colostrums immediately after birth?	1.yes 2.no															
308	Was the child exclusively breastfed after birth?	1.yes 2.no	if no go to# 310														
309	How long does/was the child exclusively breast fed?	_____months															
310	Are you still breasting feeding?	1.yes 2.no	if no #312														
311	How many times per 24 hours do you breastfeed?	_____times/24 hours															
312	What milk did the child drink If	1. Formula milk 2. Cow's milk 3.not feeding															

	not breastfed?	96.other	
313	Did you give the child pre-lactation food/fluid?	1. Yes 2.No	if no skip to #316
314	If yes what food or fluid?	1. Water 2.butter 3. Milk 96 other specify	if no # 316
315	Have you partially breast fed? (breast milk and formula or other food and drink)	1.yes 2.no	
316	How long was the child partially breastfed (breast milk and formula or other food and drink)	_____months	
317	Is it prepared hygienically(ask how she prepares and fill)	1.yes 2.no	
318	How is the child fed	1 bottle 2.cup 3,spoon	
319	Have you stopped breast feeding your child?	1. Yes 2. No	if no # 321
319.1	For how long did you child breast fed your child?	_____	
320	At what age did you start complementary feeding?	_____	
321	How the food is prepared (density and variety?) ask the type of cereals or ingredients and the way she prepares it?	1.Dense and varied 2.not dense and varied	
322	How many times per 24 hour did the child feed? (Approximate by asking how many time she fed till the time of interview).	_____	

iv. mothers characteristics			
401	Mothers or care givers height mothers weight mothers age MUAC	_____ _____ _____ _____	
402	Did the mother attended antenatal care during pregnancy?	1.yes 2.no	
403	If yes how many visits?	_____	
404	Did the mother smoke or drink alcohol during pregnancy?	1.yes 2.no	
405	Does the father smoke?	1.yes 2.no	

Name of interviewer:-_____

Checked by investigator/supervisor signature_____

Thank you very much for your time and participation!!!

Annex:-II Afaan Oromo version of the questionnaire.

Unkaa hayyamaa hirmaatummaa.

Gaaffilleen kunniin kan qophaa'an hospitaala kana keeessatti sababiilee hir'ina nyaataa daa'immaan waggaa shanii gad ta'anii adda baasuu dhaafi.

Akkam oolte/ bulte? Maqaan koo _____jedhama. Qorannoo hir'inna nyaata daa'imman waggaa shanii gad jiraniif sababa ta'an adda baasuuf universitii Gondar ,kolleejii fayyaa ,institootii fayyaa hawaasaa wajjiin ta'uudhaan gaggeeffamu irratti odeeffannoo sassaabaa/bduu dha.

Maqaan kee yookaan kan daa'ima kee odeeffannoo ati nuuf kennitu wajjiin wal hin qabatu.Gaaffilee ati deebisuudhaaf fedhii hin qabaanne ykn hin barbaanne akka deebiftuuf hin dirqamtu.Yeroo barbaaddettis gaaffii ykn qorannoo kana addaan murtee ba'uu ni dandeessa .Garuu deebiin sirrii ati nuuf kennittu kuni rakkoolee hir'innaa nyaata daa'immannii fidan furuu dhaa fi du'a daa'imman waggaa shanii gad jiran hambisuuf baa'ee barbaachisaa dha.Gaaffii dhaan dabalata haala daa'imni keessa jiru adda baasuu dhaaf dheerinni fi ulfinni daa'ima keetiis ni safarama.

Waraqaan waligaltee kun fedhii irratti kan hundaa'ee fi kan mirga kee kophaa irratti hundaa'ee dha.Hirmaachuudhaaf fedhii ni qabdaa?

Waligalatti gaaffilee kanneen deebisuudhaaf daqiiqaa 30 fudhata.

Mallattoo gaafataa odeeffannoo qorannichaa waliigaltee afaanii hirmaataa irraa argachuu isaa mirkaneessuudhaaf_____

001.Lakkoofsa gaaffichaa _____

002.Koodii nama odeeffanno fuunanuu_____maqaa_____

003.Guyyaa odeeffannoon fudhatame_____

004.Teessoon_____

005.Haala Gaaffiin guuttame:- Guutummaan guutuutti guuttamee jira_____walakkaan isa guuttamee jira_____.

kuta 1 ^{ffaa} Gaaffi hawaasummaa			
lakk.	Gaaffii	Deebii	lbsa ykn darbuu
101	Gaggeessaan manaa eenyu?	1.Dhiira 2.Dhalaa	
102	Haalli fuudhaa/haalli bultii ?	1.Waliin jiru 2.Hiikanii jiru 3. Irraa du'e 4.Addaan bahanii jiru 5.Kophaa jiru	
103	Baay'ina waliigala maatii mana keessa jiraatan	_____laakkofsaan	
104	Baay'inna ijoolle oboleessa/obboleettii daa'ima	_____lakkoofsaan	
105	Sadarkaa barnoota haadhaa ykn kutaa xumurte?	1.Hin baranne 2.Dubbisuufi barreessuu 3. Sadarkaa 1 ^{ffaa} (kutaa1-8) 4.Sadarkaa 2 ^{ffaa} (kutaa 9-12) 6.Diplooma 7 digrii fi isaa ol.	
106	Sadarkaa barnoota abbaa manaa ykn kutaa xumure.	1.Hin baranne 2.Dubbissuu fi barreessu 3,Sadarkaa 1 ^{ffaa} (kutaa 1-8) 4.Sadarkaa 2 ^{ffa} (kutaa 9-12) 5.Diplooma 6.Digrii fi isaa ol	
107	Hojiin haadha manaa malli? deebiin tokkoo olii ni danda'ama	1. Haadha manaa 2.Qottee bultuu 3.Daldaltuu 4.Hojjattu hojii mootummaa 5.Hojjii dhuunfaa 96,kan biraa	
108	Hojiin abbaa manaa maali dha? deebiin tokkoo olii ni danda'ama	1.Barataa 2.Qotee bulaa 3.Hojii mootummaa 4.Daldalaa 5.Hojii dhuunfaa 6.Hojjataa guyyaa 96.kan biraa ,insi.	
109	Ji'atti galiin manaa meeqa?	_____qarshii	
110	Itti fayyadama maalaqa argattan irratti eenyutu murteessa?	1. Haadha manaa qofa 2.Abbaa manaa qofa 3.Lamaanuu waliin ta'uun	
111	Horii manaa ni qabduu?	1 Eeyyen 2.Hin qabnu	yoo hin qabne # 113

112	Meeqa ta'u ? - Loon - Re'ee - Hoolota - Indaqoo - Fardaa fi harree Waligalatii	Laakkofsaan ----- ----- ----- ----- ----- -----	
113	lafa qonnaa/loonii ni qabduu?	1.Hin qabnu 2. Niin qaba	
113.1	Lafa qonnaa/loonii hangam qabdu?	Qarxii ykn heektaara _____	
114	Sanyiin/qomoon keessan maali?	1.Oromoo 2.Amaara 3.Tigree 4.Guraage 5 Kan biroo	
115	Amantiin keessan maali?	1 Ortodooksii 2.Islaama 3.Protestaantii 4.Kaatolikii 96.kan biro	
kutaa 2^{ffaa} haala daa'imaa			
201	Saala daa'imaa	1.Dhiira 2.dhalaa	
202	Ulfaaatinni daa'imaa yeroo dhalatu hangam ture (yoo yaadatate ykn kaardii talaallii irraa)	1._____kg 2.Hin beeku	
203	Yeroo dhalatamuu daa'imni hangam ga'a ture?	1.Baay'ee guddaa 2.Gidduu galeessa 3.Baay'ee xiqqaa	

		99. hin beeku	
204	Umuriin isaa /ishee meeqa?	_____ ji'aan	
205	Daa'ima meeqaffaa keetii?	1. ^{ffaa} 2. ^{ffaa} 3. ^{ffaa} 4.daa'ima isa dhumaa irra 2 ^{ffaa} .	
206	Bakki itti deesse eessa ?	1.Mana 2. Maana yaalaa	
207	Torbaan/ji'a meeqaffatti dhalate/tte?	_____lakkofsaan	
208.1	Dheerina	_____cm	
208.2	Ulfaatina	_____kg	
208.3	MUAC	_____cm	
209	Daa'imni iita hir'ina nyaataan walqabatee dhufu ni qabaa?	1.Eeyyen 2.Hin qabu	
210	Sababa maaliin hospitaala/buufata fayyaa dhufe/dhufte?	1.Hordoffii guddinaatiif 2.Yaalaaf 3.Beellama waan qabuuf 4.Tallaallidhaaf/kittibaataaf 96.kan biro	
211	Torbaan lamaa darbe keessatti daa'imni garaan ni yaasaa ture/turtee?	1.Eeyyen 2.miti	
212	Torbaan lameen darben keessa laydemee ni beeka/beektii?	1.Eeyyen 2.Miti	
213	Torbaan darbe keessatti daa'imni kee dhukkuba ujummoo afuura gamaa olii dhukkubeeni ni beeka/beektii?	1.Eeyyen 2.Miti	

kutaa 3^{ffaa} kunuunsa daa'imaaf godhamu

301	Yeroo hangam hangamiin daa'imni kee mana yaalaa dhufa?	1.Torbaaniin 2.Baatitti/ji'atti 96.Kan- biro																	
302	Waa'ee Wantoota kanatti aananii tarreeffaman irratti gorsa fudhatte turtee? ✓ Waa'ee garaa baasaa/deemsisa ✓ sirna nyaata ✓ waa'ee harma haadhaa daa'iimmaniif hoosisuu irratti ✓ Nyaata dabalta daa'immannif keenuu. ✓ Nyaata madaaleessu? ✓ waraqaa guddina daa'immanii ittiin hordofu. ✓ Qulqullinna qaamaa fi nyaata eeeguu? ✓ kan biraa	1.Eeyyen 2. Miti <table><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table>																	
303	Daa'imni talaalli umrii isaatiif/isiitiif barbaachisu hunda fudhatee jira?	1.Eeyyen 2.Miti																	
304	Daa'imni vit A baatilee jahan darban keessatti fudhatee ture?	1.Eeyyen 2.Miti																	
305	Daa'ima kee harma luugsiftee/hoosiftee ni beektaa?	1.Eeyyeen 2.Miti	yoo eeyyen ta'e #307																
306	Yoo hin luugsiisin/hoosisin sababni isaa maal?	_____																	
307	Daa'imni yeroo dhalattetti silga/siila harma haadhaa luugee ture?	1.Eeyyen 2.Miti																	
	Daa'imni erga dhalatee																		

308	kaaseeharma haadhaa qofaa luugaa ture/turtii?	1.Eeyyen 2.Miti	
309	Hanga baatii meeqaatti harma haadhaa qofa luuge/luudge?	_____	
310	Yeroo Ammaatti Daa'imni kee harma Luugaa jira	1.Eeyyen 2.Miti	yoo miti ta'e #312
311	Guyyaatti ykn sa'aa 24 keessatti si'a meeqa luuga/luugdi?(hanga ammaa yeroo meeqa akka kennite gaafachuudhaan tilmaami).	_____	
312	Harma haadha yoo fudhachaa hin turree/jirre kan malii fudhachaa ture/turte(jira/jirti)?	1.kan horii 2.kan daakuu 3.luuguu dhaabee/dhaabdee jirti 96.kan biro	
313	Daa'imni kee osoo harma luuguu hin jalqabin dura garaa duwwaatti dhangalaa'aa ykn nyaata kennitee turtee?	1.Eeyyeen 2.Miti	yoo miti ta'e gara # 315
314	Yoo kennitee turte maal ture?	1.Bishaan 2. Dhadhaa 3. Aannan 96 .kan biro ibsi	
315	Harmaa keetiifi aannaan suuqii irraa bitamu ykn dhangala'oo walitti makuudhaan kennitee ni beektaa?	1.Eeyyen 2.Miti	yoo miti ta'e gara # 317
316	Yeroo hangamiif harma haadhaa fi dhugaatii ykn nyaata adda addaa daa'ima keetiif kennite?	Baatii/ ji'a _____f	
317	Haalli qulqullina nyaataa fi harmaa haadhaa maal fakkaata?	1.Qulqullinni isaa ni eeggama 2.Qulqullini isaa hin eeggamu	

318	Aannan maaliin luuga/luugdi?	1.Xuunxoodhaan 2.Burcuqqoodhaan 3,Mooqqaa dhaan	
319	daa'ima kee harma luuguu dhaabdee jirta?	1. eeyen 2. miti	
319.1	Walumaagalatti daa'imni kee harma kee baatii meeqaaf luuge?	_____	
320	Nyaata dabalataa baatii/ji'a meeqaffatti jalqabddeefi	_____	
321	Haalli nyaata itti qopheessitu maal fakkaata (jajjabaa fi midhaan gosoota adda addaa irraa hojjattamuu?)	1 jajjabaa fi midhaan gosa adda addaa irraa hojjatama 2.jajjabaa miti kan midhaan gosa tokko irraa hojjatamee .	
322	Guyyaatti yeroo meeqa nyaata?	_____	
kutaa 4^{ffaa} haala haadhaa			
401	Dheerinni haadhaa Ulfinnii haadhaa Umurii MUAC	_____ _____ _____ _____	
402	Yeroo ulfaa hordoffii ulfaa fudhachaa turtee?	1.Eeyyeen 2.Miti	too miti ta.e gara # 404
403	Marsaa meeqaaf?	_____	
404	Tamboo ni xuuxxaa?	1.Eeyyen 2. Miti	
405	Abbaan manaa kee tamboo ni xuuxxaa?	1.Eeyyeen 2.Miti	

Maqaa nama odeeffannoo sassaabee_____Kan mirkaneesse_____

Yeroo kee kennuudhaan waan hirmatteef Galatoomi!!!

Annex:-III Information sheet and consent form

Title of the research

Risk factors of malnutrition in underfive children in chiro zonal hospital/harerghe zone, Oromiya region, Eastern Ethiopia 2012.

Name of investigator:-Paulos Samuel.

Name of the Organization:-University of Gondar College of medicine and health sciences institute of public health.

Name of sponsos

This information sheet and consent form was prepared for children underfive years of age with their mothers or care givers who participated in the research aimed at identification of risk factors of malnutrition in chiro zonal hospital.

Introduction

This information sheet and consent form was prepared with the aim of explaining the research project in which you are asked to join by the investigator. The main aim of the research is to identify risk factors of malnutrition in underfive children. The investigators include four nurses from the hospital and one BSC Nurse from the zonal health department one investigator and advisor from university of Gondar.

Purpose of the research project

The purpose of the research project is to identify risk factors of malnutrition in underfive children .It is important to identify risk factors of malnutrition in underfive children because most of the growth and development of children takes at an earlier period that is within the first 2 years of life .So unless their growth and development is insured at this period their future productivity and potential will be reduced above all they will be vulnerable to diseases which are fatal unless intervened appropriately. So in order to avoid this problem identifying factors for malnutrition in underfive children is very important for the planners, policy makers and stake holders at different positions.

Procedure

In order to identify risk factors of malnutrition in underfive children we kindly request you together with your child to participate on this research project. If you are willing to participate in the research you first need to understand the purpose of the research and then sign a consent form which insures your agreement of participation on voluntary basis and having done those you are requested to respond to the question which the data collectors ask you.

For this particular study the study subjects are children in underfive years with their mothers or care givers who visit this hospital for treatment, follow up ,immunization or those children with diagnosed as having any type of malnutrition and are either taking the nutritional therapy at OTP or admitted at S/C will be included in the study.

Risk and /discomfort

By participating on this research you or your child may feel discomfort when taking anthropometric measurements and also it may take your time .But this may not be too much as this research tries to identify the risk factors of malnutrition in underfive children which is the common problems of the community and you are among them. So your genuine response helps us to clearly identify the factors and recommend the concerned body for intervention .There is no risk that you or your child gets in participating on this research.

Benefits

In participating on this research there is no direct benefit that you get but being participant on this research you will help us and the community in identifying the risk factors of malnutrition in underfive children so that appropriate intervention will be made that reduces the burden and death of underfive children

Incentives/payments for participating

There is no incentive or payment that you will get due for your participation on this research

Confidentiality

The information that you tell us or we get from anthropometric measurements will be kept confidential and information including personal identification for this research purpose will be without name only by code. This information will not be exposed to any other person except the principal investigator and it will be kept locked.

Right to refusal or withdraw

You have full right of refusing to participate on the research and you can also refuse to respond to some or all questions and this will not harm you from getting the health services including the nutritional therapy from the hospital. You can at any point withdraw from the study and this will not deprive your right.

Person to contact

This research proposal will be reviewed and approved by the ethical review committee of the university of Gondar .if you want to know more about anything you can contact the committee through the following address. If you have any question you can contact any of the individuals whose address is listed below

1. **Mr. Paulos Samuel**:-Doba woreda health office west harerghe zone Oromiya region

E-mail paulos_samuel2001@yahoo.com

Mobile phone: - (+251911399446)

2. **Dr. Belaynew Wassie**:-university of Gondar college of medicine and health sciences institute of public health.

Mobile phone :-(+251913474398)

E-mail bewassie@yahoo.com

Annex: - IV Afan Oromo version of information sheet

Uunka odeeffannoo fi waliigaltee hirmaattumaa

Mata dureen qorrannuichaa:-sababiilee hir'inna nyata daa'imman waggaa shanii gadii kana hospitaala chiro keessatti jiran saaxilan adda baasuuf

,

Maqaa qorataa:-Phaawuloos Saamu'eel

Maqaa dhaabbatichaa:-universitii gondaar koleejjii fayyaa ,instituuṭi fayyaa hawaasa

Maqaa spoonsaraa

uunki odeeffannoo fi waliigaltee hirmaattummaan kun kan qophaa'e haadholee daa'imman waggaa shanii gad ta'an qabaniifi daa'imman waggaa shanii gad jiranii fi kan qorrannoo kanatti hirmaataniifii dha.

Seensa

unki odeeffannoo fi waliigaltee hirmaattummaan kun kan qophaa'e waa'ee qoranno garee qorratoottatiin qoo'annicha irratti akka hirmaattaniif isin gaafatan isiniif ibsuufi dha . Hubannoo kennuudhaafi.kaayyoon qorannichaas sababiilee daa'imman wagaa shanii gad jiran hir'inna nyaataatiif saaxilan adda baasanii beekuu dha.Hirmaattoonni qorrannoo kanaa narsoota afur hospitaala kana irraa,qorataa qoo'annicha fi gorsaa universitii Gondaar irraa dha.

Kaayyoon qorannichaa

Kaayyoon guddaan qorannoo kana sababiilee hir'inna nyaata daa'imman waggaa shanii gad jiranii adda baasuudhaan beekuu dha.Daa'immaan waggaa shanii gad keessummaayyuu waga lameen duraanii keessaatti guudinni ariifachiissaan kan gaggeeffamuudha.Guddiinna kana saffisiisuuf ykn ammo haala mijeesuudhaaf sirni nyaataa murteessaa dha .Sababa kanaaf rakkoolee sirna nyaata daa'imman waggaa shanii gad jiran adda baasuu nii fi rakkoolee kanneniif furmaata haala barbaaddammun laachuun guddinnaa daa'immanni fi bu'aa isaan egereedhaaf buusan mirkannessuuf baay'een murteessaa dha.

Addeemsa qorannichaa

Sababiilee hir'inna nyaataaf saaxilan adda baasuudhaaf ati akka qo'annichatti hirmaattu gaaffi yeroo siif dhiyeessinnu kabajaa guddaa dhaani. Yoo fedhii kee ta'ee hirmaatta taanaan kaayyoo qorannichaa erga sirritti hubatte booda waliigaltee malleettessuun sirraa eeggama .kunis fedhii kee ta'uu isaa mirkaneessa. Isa boodas gaaffii gaafatamtuuf debii sirri deebissuun kee barbaachisaa dha,

Qo'annoo kanaaf hirmaattonni hadholee fi daa'imman waggaa shanii gad sababa adda addaatiin hospitaala kana dhufanii dha.

Miidhaa ykn haala mija'aa hin taane

Qorannoo kana irrattii hirmchuu keetiin daa'imni kee yeroo ulfatinni fi dheerinnni isaa safaramu haali isaa mijaa'uu dhabuu danda'a. kanaan dabalta ammo yeroo muraasa sirra fudhatuu danda'a. kunii garuu bu'aa qorannichaa ykn rakkina hir'inna nyaataa da'imman waggaa shanii gad jiran adda baasuudhaan beekuu fi rakkoo kana furuu dhaaf kallattii furmaata argachuu isaa wajjiin yeroo madaalamu wamaa miti. Atis miseensota ummattichaa keessaa tokko waan taateef deebiin sirri ati nuuf kennituu kun baay'ee murteessaa dha. Qorrannichat hirmaachuu keessaniin midhaan isin irratti gahu garuu hin jiru.

Buu'aa qorrannichaa irraa argamu

Qorrannichatti hirmaachuu keetiin buu'aan kallattiidhaan ati argattu hin jiru garuu rakkoon kun rakkoo ummataa fi kee waan ta'eef sababa isaa adda baafnee beekuu irratti fi kallatti furmaataa barbaaduu irratti gargaarsa guddaa nuu fii ummattichaaf kennitta.

Miiroo (jajjabeessituu) Kafaltii hirmaatumma

Qorannicha kanatti hirmaa keetiif kafaltiin kafalamu hin jiru

Iciitii eeguu

Odeeffannon ati nuuf kennituu fi nuti argannu hundii icitii dhaan eeggama. kanaan dabalataa odeeffannon argamuu gama hundaan maqaa keetiin fi kan daa'ima keetin ala ta'a. kana jechuun odeeffannoon kun kan kee fi kan daa'ima kee ta'uu isaa kan ibsuu ykn adda baasu maqaan hin jiraatu jechuu dha. kunis koodii qofaan taa'ee qorrataan qofti beeka malee namni biraa beekuu hin danda'u. bakka namni argattis hin taa'uu meeshaa keessatti godhamee itti cufama.

Mirga qorrannichatti hirmaachuudhaaf diduu ykn giddutti dhiisanii ba'uu danda'uu

Qorrannichatti hirmaachuu diduu dhaaf mirga guutuu ni qabda .kanaan dabalata gaaffilee muraasaaf ykn gaaffii hundaaf deebii laachuu dhisuu ni dandeessa.kana wajjiin wal qabate rakkinni si muudatu hin jiraatu.Tajaajila barbaaddu hundas argachuu ni dandeessa.jidduutis adda kutte qorrannicha keessaa bahuu ni dandeessa.

Odeeffannoo argachuuf Nammoota qunnamuu dandeessan

Qorrannichi kun koree naamusa qorrannoo univesitii goondariitiin erga mirkanaa'ee booda gaggeeffama.kana ilaalchisee gad fageenyaan beekuu yoo barbaadde karaa armaan gaditti tarreeffamaniin wal qunnamuu ni dandeessa.jidduu qorrannicha gaaffii kamiyyuu yoo qabaatte namoota armaan gaditti caqafaman dubbisuu ni dandeessa.

1. obbo Phaawiloos Saamu'eel wajjirra fayyaa Aanaa Dobbaa,godina h/lixaa.naannoo oromiyaa

Lakk bilbiaa :-(+251911399446)

E-meelii paulos_samuel2001@yahoo.com

2.Dr, Beelaynew Waasiyee.

Lakk bilbilaa :-(+251913474398)

E-meelii bewassie@yahoo.com

Annex V: - Declaration

1. Declaration of the Principal Investigator

I, the undersigned, declared that this thesis is my original work in partial fulfillment of the requirements for the degree of master of public health. All the sources of the materials used for this thesis and all people and institutions who gave support for this work are fully acknowledged.

Name- Paulos Samuel

Signature _____

Place of submission – University of Gondar Institute of Public Health

Date of submission _____

Approval of the Primary Advisor

This thesis work has been submitted for examination with my approval as university advisor.

Advisor's name – Dr. Belaynew Wassie

Signature_____